Contents

Conference Photograph vi

Preface vii

Conference Information viii

Chapter 1. Carrier dynamics in quantum dots

Excitonic and biexcitonic effects in the coherent optical response of semiconductor quantum dots
U. Hohenester, F. Rossi and E. Molinari 1

Optically detected intersublevel resonance in InAs/GaAs self-assembled quantum dots
B.N. Murdin, A.R. Hollingworth, J. Barker, P.C. Findlay, C.R. Pidgeon, J.-P. Wells, I.V. Bradley, G. Knippels and R. Murray 5

Hot carrier relaxation in InAs/GaAs quantum dots
R. Heitz, I. Mukhametzanov, H. Born, M. Grundmann, A. Hoffmann, A. Madhukar and D. Bimberg 8

Many-body effects in carrier capture and energy relaxation in self-organized InAs/GaAs quantum dots
Z.L. Yuan, E.R.A.D. Foo, J.F. Ryan, D.J. Mowbray, M.S. Skolnick and M. Hopkinson 12

Homogeneous line width of optical transitions and electronic energy relaxation in quantum dots
K. Král and Z. Khás 15

Fabrication and electrical characterization of planar resonant tunneling devices incorporating InAs self-assembled quantum dots
S.K. Jung, S.-H. Song, S.W. Hwang, J.H. Park, Y. Kim and E.K. Kim 18

Carrier dynamics in double barrier diodes incorporating quantum dots
A. Patanè, A. Polimeni, L. Eaves, P.C. Main, R.K. Marshall, M. Henini, Yu.V. Dubrovskii, A.E. Belyaev and G. Hill 21

Resonant tunneling spectroscopy of InAs quantum dots buried in the GaAs
K. Yoh and Y. Kitasho 24

On the non-orthogonality problem in the description of quantum devices
J. Fransson, O. Eriksson, B. Johansson and I. Sandalov 28

Chapter 2. Coupled quantum dots

Microwave spectroscopy of a double quantum dot in the low- and high-power regime
W.G. van der Wiel, T. Fujisawa, T.H. Oosterkamp and L.P. Kouwenhoven 31

Carrier dynamics in quantum dot structures with different interdot spacings
S. Marcinkevičius and R. Leon 36

Phenomenological theory of the Rabi oscillation in coupled quantum dots
T. Aono, K. Ishibashi and Y. Aoyagi 39

Phonon emission from coupled quantum dots
T. Brandes and B. Kramer 42

Quantum gates by coupled quantum dots and measurement procedure in Si MOSFET
T. Tanamoto 45

Hot carrier scaling of localization in a quantum dot array
L.-H. Lin, N. Aoki, K. Nakao, A. Andresen, C. Prasad, F. Ge, J.P. Bird, D.K. Ferry, Y. Ochiai, K. Ishibashi, Y. Aoyagi and T. Sugano 49

Carrier dynamics in site-controlled InAs dots analyzed by time-resolved micro-photoluminescence
T. Nishimura, T. Ishikawa, S. Kohmoto, K. Asakawa and O. Wada 53

Quantum information in semiconductor-based nanostructures
P. Zanardi and F. Rossi 57

Voltage and temperature limits for the operation of a quantum dot ratchet
H. Linke, H. Xu, A. Löfgren, W. Sheng, A. Svensson, P. Omling, P.E. Lindelof, R. Newbury and R.P. Taylor 61

Charge glass transition in disordered two-dimensional arrays of mesoscopic grains
Y. Enomoto 64

Chapter 3. Point contact and single electron tunneling phenomena

Vertical quantum dots with elliptically deformed cross sections
D.G. Austing, S. Sasaki, S. Tarucha, S.M. Reimann, M. Koskinen and M. Manninen 68

Saturation of phase breaking in an open ballistic quantum dot
D.P. Pivin, A. Andresen, J.P. Bird and D.K. Ferry 72

Transport coefficients for carriers with fractional exclusion statistics: the correlation function approach
A. Greiner, L. Reggiani and T. Kuhn 75

Quantum hole transport in GaAs–Ge–GaAs lateral narrow junctions
M. Inada and S. Yamada 78

Analysis of electron incoherence effects in solid-state biprism devices
N. Machida and K. Furuya 82

Simulation of Si multiple tunnel junctions
H.-O. Müller, D.A. Williams, H. Mizuta, Z.A.K. Durrani, A.C. Irvine and H. Ahmed 85

Conductance oscillation characteristics of GaAs Schottky wrap-gate single-electron transistors
S. Kasai, Y. Satoh and H. Hasegawa 88

Effect of stray capacitances in a multiple-tunnel junction memory device
M.B.A. Jalil and M. Wagner 92

Chapter 4. Transport phenomena in quantum wells and wires

Picosecond and femtosecond near-field optical spectroscopy of carrier dynamics in semiconductor nanostructures
Ch. Lienau, V. Emiliani, T. Günther, F. Intonti and T. Elsaesser 96

Optical and transport studies of hot electrons in modulation-doped quantum wires
A.C. Maciel, J. Kim, E.D. O'Sullivan, J.F. Ryan, A. Schwarz, A. Kaluza, H. Hardtdegen, Th. Schäpers, D. Meertens, Ch. Dieker and H. Lüth 101

Intrasubband and intersubband scattering in semiconductor quantum wires
R. Ambigapathy, D.Y. Oberli, J.-D. Ganière, E. Kapon and B. Deveaud 107

Magnetotransport in an InAs/AlGaSb quantum wire with a weak periodic potential
T. Maemoto, M. Ichiu, A. Ohya, S. Sasa, M. Inoue, K. Ishibashi and Y. Aoyagi 110

Spin-splitting transport in $In_{0.75}Ga_{0.25}As/In_{0.75}Al_{0.25}As$ quantum wire field-effect-transistor
Y. Sato, S. Gozu, T. Kikutani and S. Yamada 114

Observation of N-shaped negative differential resistance in ridge-type InGaAs/InAlAs quantum wire field-effect transistor
S.J. Kim, T. Sugaya, M. Ogura, Y. Sugiyama and K. Tomizawa 117

Characteristics of GaAs Schottky in-plane gate quantum wire transistors for switching of quantized conductance
H. Okada and H. Hasegawa 123

Spatially resolved measurements of hot-electron generation and relaxation at the breakdown of the quantum Hall effect
G. Nachtwei, I.I. Kaya, B.E. Sagol, K. von Klitzing and K. Eberl 127

A hydrodynamic description of quantum Hall effect breakdown
L. Eaves 130

Lateral tunneling through the controlled barrier between edge channels in a two-dimensional electron gas system
A.A. Shashkin, V.T. Dolgopolov, E.V. Deviatov, B. Irmer, A.G.C. Haubrich, J.P. Kotthaus, M. Bichler and W. Wegscheider 133

Magnetotransport study of sub-100 nm line-and-space structure: Weiss oscillation in a short period planar structure
M. Yamaguchi, M. Kawai, Y. Inagaki, Y. Arashima, N. Sawaki and E. Gornik 136

Hot electron intervalley transfer in GaAs–AlAs MQWs: population inversion and possibility of intraband lasing
V.Ya. Aleshkin, A.A. Andronov, A.V. Antonov, E.V. Demidov, V.I. Gavrilenko, D.G. Revin, B.N. Zvonkov, N.B. Zvonkov and E.A. Uskova 139

Photoluminescence from hot electrons in quasi-one- and two- dimensional systems
H. Momose, Y. Inui and C. Hamaguchi 143

Photoluminescence from two-dimensional electron gas in AlGaAs/GaAs heterojunctions under high electric fields
K. Aoki 146

Electron transport in a large spin-splitting 2DEG in InAs/AlGaSb heterostructures
S. Sasa, K. Anjiki, T. Yamaguchi and M. Inoue 149

Chapter 5. Tunneling phenomena

Relaxation of electrons within AlAs barriers studied by hot electron spectroscopy
S. Sivaraya, S.J. Bending and M. Henini 153

Hot electrons in superlattices: quantum transport versus Boltzmann equation
A. Wacker, A.-P. Jauho, S. Rott, A. Markus, P. Binder and G.H. Döhler 157

Theoretical insights into $CoSi_2/CaF_2$ tunneling diodes
C. Strahberger and P. Vogl 160

The transition to chaos for hot electrons in a wide quantum well
R.K. Hayden, P.B. Wilkinson, T.M. Fromhold, L. Eaves, F.W. Sheard, M. Henini and N. Miura 163

Multi-band simulation of resonant tunneling diodes with scattering effects
M. Ogawa, T. Sugano, R. Tominaga and T. Miyoshi 167

Observation of acoustic phonon Stokes and anti-Stokes peaks due to assisted tunnelling in a triple barrier structure
S.A. Cavill, A.J. Kent, L.J. Challis, F.F. Ouali and M. Henini 171

Chapter 6. Vertical transport in superlattices

Scattering and Bloch oscillation in semiconductor superlattices
C. Rauch, G. Strasser, K. Unterrainer, A. Wacker and E. Gornik 175

Field-induced delocalization and Zener breakdown in semiconductor superlattices
B. Rosam, F. Löser, V.G. Lyssenko, K. Leo, S. Glutsch, F. Bechstedt and K. Köhler 180

Drude absorption and electron localization in GaAs/AlGaAs superlattices
K. Tamura, K. Hirakawa and Y. Shimada 183

$k_{||} = 0$ filtering effects in ballistic electron transport through sub-surface resonant tunneling diodes
R. Heer, J. Smoliner and G. Strasser 187

Magnetic field quenching of miniband conduction in quasi-one-dimensional superlattices
L. Eaves, H.M. Murphy, A. Nogaret, S.T. Stoddart, P.C. Main, M. Henini, N. Mori, C. Hamaguchi, D.K. Maude and J.-C. Portal 190

Simultaneous investigation of vertical transport and intersubband absorption in a superlattice: Continuum Wannier–Stark ladders and next-nearest-neighbor tunneling
M. Helm, W. Hilber, G. Strasser, R. DeMeester, F.M. Peeters and A. Wacker 194

Light-hole Stark-ladder photoluminescence induced by heavy-hole–light-hole resonance in a GaAs/InAlAs superlattice
K. Kuroyanagi, N. Ohtani, N. Egami, K. Tominaga, M. Hosoda, H. Takeuchi and M. Nakayama 198

Complex behavior due to electron heating in superlattices exhibiting high-frequency current oscillations
H. Steuer, A. Wacker and E. Schöll 202

Phase diagram of static and dynamic electric field domain formation in semiconductor superlattices
N. Ohtani, N. Egami, H.T. Grahn and K.H. Ploog 205

Chaos-induced orbit delocalization and complex Bloch oscillations in semiconductor superlattices
C.R. Tench, T.M. Fromhold, S. Bujkiewicz, P.B. Wilkinson, F.W. Sheard and L. Eaves 209

Self-consistent hopping transport in superlattices: non-equilibrium distribution functions and electron heating
S. Rott, N. Linder and G.H. Döhler 213

Chapter 7. Intersubband transition and quantum cascade structure

Terahertz-electroluminescence in a quantum cascade structure
J. Ulrich, R. Zobl, N. Finger, K. Unterrainer, G. Strasser and E. Gornik 216

Theoretical study and simulation of electron dynamics in quantum cascade lasers
S. Tortora, F. Compagnone, A.Di Carlo, P. Lugli, M.T. Pellegrini, M. Troccoli and G. Scamarcio 219

Intrasubband fast absorption and emission of terahertz radiation by hot electrons in GaAs/AlGaAs MQW
L.E. Vorobjev, S.N. Danilov, D.V. Donetsky, D.A. Firsov, E. Towe, R.Kh. Zhukavin, S.G. Pavlov and V.N. Shastin 223

Terahertz lasers using inter-subband transitions in quantum wells: predictions from Monte Carlo simulation
P. Kinsler, R.W. Kelsall and P. Harrison 226

Effect of intercarrier scattering on intersubband transitions in GaAs/AlGaAs quantum well systems
M. Dür, S.M. Goodnick, P. Lugli and B. Deveaud 230

Many-body effects in intersubband transitions of modulation-doped quantum wells
B. Nottelmann, V.M. Axt and T. Kuhn 234

Static screening approximations for calculations of intersubband electron–electron scattering rates in semiconductor quantum wells
S.-C. Lee and I. Galbraith 237

Chapter 8. High field transport and impact ionization

Impact ionization of DX^--centers in GaAs : Si by hot electrons
M. Asche, O.G. Sarbey and Z. Wilamowski 241

Numerical simulation of crystallographic direction-dependent impact ionization process on GaAs
H.K. Jung, H. Nakano and K. Taniguchi 244

Thermal conductivity of nonequilibrium carriers
L. Varani, P. Gaubert, J.C. Vaissière, J.P. Nougier, J. Mateos, T. González, D. Pardo, L. Reggiani, E. Starikov, P. Shiktorov and V. Gruzhinskis 247

High-field electron transport in GaInP
R. Sakamoto, K. Nakata and S. Nakajima 250

Full band Monte Carlo simulation for temperature-dependent electron transport in gallium nitride
Y. Ando, Y. Hori, W. Contrata and N. Samoto 253

Analysis of hole transport in cubic phase of p-type GaN by relaxation time approximation
Y. Hayashi, T. Soga, M. Umeno and T. Jimbo 256

Chapter 9. Current fluctuations and noise

Generalized transfer-fields and Langevin forces for hot-carrier fluctuations in semiconductor submicron devices
E. Starikov, P. Shiktorov, V. Gružinskis, L. Reggiani, L. Varani, J.C. Vaissière, J.P. Nougier, T. González, J. Mateos and D. Pardo 260

2D bipolar Monte Carlo calculation of current fluctuations at the onset of quasisaturation of a Si BJT
M.J.M. Martínez, D. Pardo and J.E. Velázquez 263

Instabilities caused by avalanche in single barrier diodes
A. Krotkus, A. Reklaitis, A. Geižutis, G. Grigaliūnaite and M. Asche 267

Symmetry-breaking multiple current filamentation in n-GaAs
G. Schwarz, C. Lehmann and E. Schöll 270

Dynamics of filamentary currents in Corbino discs under magnetic fields
K. Aoki and S. Fukui 274

Prediction of enhanced shot-noise in tunneling-controlled transport
A. Reklaitis and L. Reggiani 279

Shot-noise suppression in nondegenerate semiconductors: the role of an energy-dependent scattering time
T. González, J. Mateos, D. Pardo, L. Reggiani and O.M. Bulashenko 282

Joint effect of Fermi and Coulomb correlations on shot-noise suppression in ballistic conductors
T. González, J. Mateos, D. Pardo and L. Reggiani 285

Microwave-induced multiple field-domain structure in photoexcited GaAs crystals
L. Subačius, P. Shiktorov, V. Gružinskis, E. Starikov, K. Jarašiūnas and L. Reggiani 288

Transient studies of light emission from travelling space charge domains in GaAs and $Ga_{1-x}Al_xAs$
N. Balkan and M. Hostut 291

Chapter 10. Quantum transport and Monte Carlo simulation

First principles modeling of high field transport in wide-band-gap materials
M. Dür, S.M. Goodnick, R. Redmer, M. Reigrotzki, N. Fitzer and M. Städele 295

Quantum versus classical scattering in semiconductor charge transport: a quantitative comparison
A. Bertoni, P. Bordone, R. Brunetti, C. Jacoboni and N. Sano 299

Fokker–Planck type approach to hot carriers in semiconductor submicron structures
Y. Abe 302

Transient carrier dynamics calculation in time domain; Coulomb scattering within RPA
Y. Kurokawa and T. Takemori 306

Electron temperature and cooling of 2D hot electron gas in deep quantum wells
N.A. Zakhleniuk, B.K. Ridley, M. Babiker and C.R. Bennett 309

Chapter 11. Quantum kinetics and spin-dependent phenomena

Carrier dynamics in the quantum kinetics regime
W.A. Hügel, M.F. Heinrich and M. Wegener 313

Picosecond electron-spin relaxation in GaAs/AlGaAs quantum wells and InGaAs/InP quantum wells
A. Tackeuchi, T. Kuroda, S. Muto and O. Wada 318

Exciton spin relaxation in semiconductor quantum wells: the role of disorder
F. Henneberger and H.-J. Wünsche 324

When do excitons really exist?
D. Hägele, J. Hübner, W.W. Rühle and M. Oestreich 328

Spin-dependent transport phenomena in a HEMT
A. Bournel, P. Dollfus, P. Bruno and P. Hesto 331

Dressed semiconductor bloch equations: coherence versus Coulomb scattering in resonantly excited quantum wells
C. Ciuti, C. Piermarocchi, V. Savona, P. Selbmann, A. Quattropani and P. Schwendimann 335

Relation between spin and momentum relaxation in ZnSe/ZnMgSSe quantum wells
D. Hägele, M. Oestreich, W.W. Rühle, J. Hoffmann, S. Wachter, H. Kalt, K. Ohkawa and D. Hommel 338

Dicke superradiance in a magnetoplasma
T. Brandes, J. Inoue and A. Shimizu 341

Ultrafast relaxation of interband-polarization via carrier–LO phonon scattering in depletion field
M. Iida and S. Katayama 344

Chapter 12. Ultrafast and coherent phenomena

Ultrafast high-field transport in semiconductors
A. Leitenstorfer, S. Hunsche, J. Shah, M.C. Nuss and W.H. Knox 348

Coherent control of electron–hole populations in GaAs
J.M. Fraser, A.I. Shkrebtii, J.E. Sipe and H.M. van Driel 353

Coherent control of carrier–phonon scattering processes
M. Herbst, T. Kuhn and V.M. Axt 356

Femtosecond pulse shaping for coherent carrier control
A.P. Heberle, J.J. Baumberg, T. Kuhn and K. Köhler 360

Coherent control of the transient spontaneous emission from two-dimensional excitons
M. Woerner and J. Shah 363

Study of coherent LO phonon–plasmon coupled modes in n-GaAs by spectrally resolved pump–probe measurement
K. Mizoguchi, F. Miyamaru, M. Nakajima, M. Hase and S. Nakashima 367

Coherent effects in resonant quantum well optical emission
N. Garro, S.P. Kennedy, M.J. Snelling, R.T. Phillips and K.H. Ploog 371

Coherent THz plasmons in GaAs/AlGaAs superlattices
R. Bratschitsch, R. Kersting, T. Müller, G. Strasser, K. Unterrainer, W. Fischler and R.A. Höpfel 375

Femto-second photoreflectance spectroscopy of relaxation and tunneling processes in asymmetric GaAs/AlGaAs double quantum wells
N. Suzumura, R. Ogoh, M. Kawai, Y. Inagaki, M. Yamaguchi and N. Sawaki 378

Femtosecond exciton broadening in ternary II–VI semiconductor quantum wells
M.C. Netti, C. Gadaleta, N. Del Fatti, F. Vallée and R. Tommasi 381

Ultrafast spectral hole burning in intersubband absorption bands of quantum-well-structures
S. Schmidt, J. Kaiser and A. Seilmeier 384

Ultrafast carrier–carrier scattering in $Al_xGa_{1-x}As$/GaAs quantum wells
K.W. Sun, T.S. Song, C.-K. Sun, J.C. Wang, S.Y. Wang and C.P. Lee 387

Femtosecond relaxation dynamics of hot carriers in photoexcited $In_{0.53}Ga_{0.47}As$
Y. Hamanaka, D. Nishiwaki, Y. Nonogaki, Y. Fujiwara, Y. Takeda and A. Nakamura 391

Influence of hot carrier dynamics on pulse propagation in semiconductor lasers
M. Kauer, A.P. Heberle, J. Allam, J.J. Baumberg and J.R.A. Cleaver 394

Chapter 13. Excitons and optical phenomena

Carrier screening and polarization fields in nitride-based heterostructure devices
F. Della Sala, A. Di Carlo, P. Lugli, R. Cingolani, G. Coli', M. Lomascolo, A. Botchkarev, H. Tang and H. Morkoc 397

Hot carrier relaxation in GaN : LO phonon scattering and excitonic effects
E.D. O'Sullivan, S. Hess, R.A. Taylor, N.J. Cain, V. Roberts, J.S. Roberts and J.F. Ryan 402

Decay of the longitudinal optical phonons in wurtzite GaN and $Al_xGa_{1-x}N$
K.T. Tsen, D.K. Ferry, S.M. Goodnick, A. Salvador and H. Morkoc 406

Energy loss rate of excitons in GaN
D. Hägele, R. Zimmermann, M. Oestreich, M.R. Hofmann, W.W. Rühle, B.K. Meyer, H. Amano and I. Akasaki 409

Carrier dynamics and recombination processes of charged excitons in a GaAs/AlGaAs quantum well
R.A. Hogg, D. Sanvitto, A.J. Shields, M.Y. Simmons, D.A. Ritchie and M. Pepper 412

Ballistic electron transport in InP observed by subpicosecond time-resolved Raman spectroscopy
K.T. Tsen, D.K. Ferry, J.-S. Wang, C.-H. Huang and H.-H. Lin 416

Ensemble Monte Carlo simulation of optical excitation of AlGaAs
L. Shifren, D.K. Ferry and K.T. Tsen 419

Effects of stimulated optical phonon decay on hot carriers in GaAs
D.A. Romanov, B.A. Glavin, V.V. Mitin and M.A. Stroscio 422

Theoretical and experimental characterizations of hot electron emission of n-Si/CaF_2/Au emitter used in hot electron detection experiment
B.Y. Zhang, K. Furuya, Y. Ikeda, N. Kikegawa, M. Watanabe and T. Maruyama 425

Relaxation of optically excited 4f electrons in Er-doped $Ga_xIn_{1-x}P$
Y. Fujiwara, T. Ito, M. Ichida, T. Kawamoto, O. Watanabe, I. Yamakawa, A. Nakamura and Y. Takeda 428

Chapter 14. Terahertz/FIR radiation

Monte Carlo study on electron motion under mid-infrared free-electron-laser pulses
N. Mori, H. Nakano, H. Kubo, C. Hamaguchi and L. Eaves 431

Picosecond time-resolved cyclotron resonance of non-equilibrium carriers in semiconductors
A.P. Mitchell, A.H. Chin and J. Kono 434

Odd terahertz optical sidebands from asymmetric excitonic intersubband excitation
M.Y. Su, C. Phillips, J. Ko, L. Coldren and M.S. Sherwin 438

Effect of electron heating and radiation pressure on tunneling across Schottky barrier due to giant near field of FIR laser radiation
A.Ya. Shul'man, S.D. Ganichev, E.M. Dizhur, I.N. Kotel'nikov, E. Zepezauer and W. Prettl 442

Cyclotron–Stark–phonon–photon resonances in semiconductor superlattices under terahertz irradiation
P. Kleinert and V.V. Bryksin 448

Fast modulation of infrared light by hot electrons in tunnel-coupled GaAs/AlGaAs quantum wells
L.E. Vorobjev, E.A. Zibik, D.A. Firsov, V.A. Shalygin, E. Towe, A. Toropov and T.V. Shubina 451

Investigation of the H-band radiation in GaAs/AlGaAs heterostructures by photoluminescence and optically detected cyclotron resonance measurements
K. Fujii, M. Saitoh, H. Nakata and T. Ohyama 454

Continuous stimulated terahertz emission due to intra-center population inversion in uniaxially strained germanium
I.V. Altukhov, M.S. Kagan, Yu.P. Gousev, V.P. Sinis, K.A. Korolev, H.K. Olsson, Yu.M. Galperin, M.A. Odnoblyudov, I.N. Yassievich and K.-A. Chao 458

Photon-assisted magnetophonon resonance in a GaAs/AlGaAs heterojunction driven by intense terahertz radiations
S.Y. Liu and X.L. Lei 461

Spin-dependent terahertz nonlinearities at inter-valence-band absorption in p-Ge
S.D. Ganichev, H. Ketterl, E.V. Beregulin and W. Prettl 464

Chapter 15. Microcavity

THz electromagnetic wave radiation from semiconductor microcavities in nonperturbative regime
M. Kusuda, S. Tokai, Y. Hokomoto, Y. Kadoya and M. Yamanishi 467

Intrinsic non-linearities in exciton-cavity-coupled systems
M. Saba, F. Quochi, C. Ciuti, G. Bongiovanni, A. Mura, U. Oesterle, J.L. Staehli and B. Deveaud 472

Observation of bottleneck effects on the photoluminescence from polaritons in II–VI microcavities
M. Müller, J. Bleuse, R. André and H. Ulmer-Tuffigo 476

Non-linear carrier dynamics in hot electron vertical cavity surface emitting laser
N. Balkan 480

Chaotic ray dynamics and fast optical switching in micro-cavities with a graded refractive index
P.B. Wilkinson, T.M. Fromhold, C.R. Tench, R.P. Taylor, A.P. Micolich and R. Newbury 484

Chapter 16. Optical nonlinearity and photonic devices

Suppression of exciton–polariton light absorption in multiple quantum well Bragg structures
G.R. Hayes, R.T. Phillips, C. Ciuti, J.L. Staehli, U. Oesterle and B. Deveaud 488

Photon Bloch oscillations in laterally confined Bragg mirrors
A. Kavokin, G. Malpuech, A. Di Carlo, P. Lugli and F. Rossi 491

The study of non-linearities in photodiodes using electrical auto-correlation
A.J. Vickers, E. Ucgun and S. Mazzucato 495

Speeding-up optical nonlinearities in hetero-n–i–p–i-structures by recombination contacts
H. M. Hauenstein, A. Seilmeier, W. Geißelbrecht, D. Streb, P. Kiesel, S. Malzer and G. H. Döhler 499

Electron spreading effects in quantum well pixelless imagers
I. Khmyrova, Ph. Bois and V. Ryzhii 502

Biexcitonic nonlinear response in GaAs thin film studied by degenerate four-wave mixing
K. Akiyama, N. Tomita, Y. Nomura and T. Isu 505

Excitonic polarization grating in semiconductors induced by short light pulses
A.V. Kavokin, G. Malpuech, A. Di Carlo, M. Vladimirova, P. Lugli and F. Rossi 509

Study of the steady state and dynamical behavior of semiconductor optical amplifiers
A. Reale, A. Di Carlo and P. Lugli 513

Strong exciton binding in hybrid GaAs-based nanostructures
G. Goldoni, F. Rossi and E. Molinari 518

Chapter 17. Carrier dynamics in small devices

Challenge and prospects for silicon SET/FET hybrid circuits
A. Toriumi, K. Uchida, R. Ohba and J. Koga 522

Theory of channel hot-carrier degradation in MOSFETs
K. Hess, L.F. Register, W. McMahon, B. Tuttle, O. Aktas, U. Ravaioli, J.W. Lyding and I.C. Kizilyalli 527

Monte Carlo simulation of hot-electron-induced dielectric breakdown in thin silicon dioxide films
Y. Kamakura, A. Ishida and K. Taniguchi 532

Energy loss to bound hydrogen at the Si surface
D.K. Ferry and K. Hess 535

Energy exchange in single-particle electron–electron scattering
D.K. Ferry, S.M. Goodnick and K. Hess 538

Link between hot electrons and interface damage in n-MOSFETs: A Monte Carlo analysis
U. Ravaioli, M. Balasubramanian and O. Aktas 542

Quantum effects in nanometer MOS structures
F. Chirico, F. Della Sala, A. Di Carlo and P. Lugli 546

Analysis of electron energy distribution function in ultra-thin gate oxide n-MOSFETs using Monte Carlo simulation for direct tunneling gate current calculation
E. Cassan, S. Galdin, P. Dollfus and P. Hesto 550

Influence of laser intensity on carrier generation in MOSFETs
M. Tanaka, T. Okagaki and M. Miura-Mattausch 554

Monte Carlo simulation of impact ionization and light emission in pseudomorphic HEMTs
G. Zandler, L. Rossi, A. DiCarlo, L. Tocca, A. Bonfiglio, M. Brunori, P. Lugli, G. Meneghesso and E. Zanoni 558

Impact-ionization-induced noise in InGaAs-based 0.1-μm-gate HEMTs
N. Shigekawa, T. Furuta, T. Suemitsu and Y. Umeda 562

Monte Carlo simulation of conductance characteristics in SOI-MOSFET
S. Araya, K. Yamasaki, H. Ueno, N. Mori, C. Hamaguchi, L.M. Perron and A.L. Lacaita 565

3-D granular Monte Carlo simulation of silicon n-MOSFETs
C.J. Wordelman and U. Ravaioli 568

Influence of non-linear effects on very short pMOSFET device performances
P. Houlet, Y. Awano and N. Yokoyama 572

Nanomechanical resonators operating at radio frequencies
A. Erbe and R.H. Blick 575

List of Contributors 578

Subject Index 582